

How to Cite:

Jasani, J. H., Chauhan, S., Patel, K., & Mehta, M. (2022). A study of prevalence and morphology of various types of leukemia's at a tertiary care centre (Dhiraj Hospital) Piparia Vadodara. *International Journal of Health Sciences*, 6(S9), 4377–4384. <https://doi.org/10.53730/ijhs.v6nS9.13759>

A study of prevalence and morphology of various types of leukemia's at a tertiary care centre (Dhiraj Hospital) Piparia Vadodara

Dr. Jasmin H. Jasani

Professor, Department of Pathology, Shrimati Bhikhiben Kanjibhai Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth, Piparia Vadodara
Correspondence author email: drjasmin27@gmail.com

Dr. Savitri Chauhan

Associate Professor, Department of Pathology, GMERS Medical College Gotri, Vadodara

Dr. Kishan Patel

Resident, Department of Pathology, Shrimati Bhikhiben Kanjibhai Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth, Piparia Vadodara

Dr. Mitsu Mehta

Resident, Department of Pathology, Shrimati Bhikhiben Kanjibhai Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth, Piparia Vadodara

Abstract--Introduction: Haematological malignancy comprises a major health problem due to its high mortality and morbidity. A progenitor cells either becomes a myeloid or lymphoid progenitor cell. The various types of hematological malignancies can be grouped according to which pathway they travel. It is important to identify haematological malignancies for prognosis and management lacunae for better risk assessment and treatment. Method: All cases with abnormal hematological findings (200 sample size) from different departments were sent to the central laboratory. According to clinical information, hematological findings and morphologic appearance of the malignant cells, types of leukemia was diagnosed. Result: Out of the 200 patients, 120 had acute leukemia, which was the most common type. The present study shows that the majority of patients having leukemia have hemoglobin in the range of 6.1-9.0 gm/dl, WBC count in the range of 51,000-1,00,000 and platelet count <50,000. Conclusion: The observation made from the study has shown maximum number of cases in the age group of 41-60 years and with male predominance. Among all leukemias, CML is the most common malignancy in the study.

Keywords---Leukemia, Hematological malignancies

Introduction

Virchow first coined the term "leukaemia" in 1847. Later, he distinguished between two types of leukemia, one with predominance of splenomegaly and the other with predominance of lymphadenopathy. Leukemia is a morbid condition with an unknown aetiology that is characterised by a widespread proliferation of leukocytes and their precursors in the body's tissues. Nearly 80% of acute leukemia cases in adults and just 20% of cases in children are caused by AML.^[1] The majority of studies have discovered a high incidence of acute myeloid leukaemia (AML), with a median age of roughly 70 years in the affected patients.^[2] The majority of studies have revealed that males are more likely to have AML than females are, with a male to female ratio of 2.5:1.^[3]

The term Acute Myeloid Leukemia (AML) refers to a variety of malignant neoplastic diseases that can be categorised using morphological, cytogenetic, molecular and genetic criteria.^[5] Due to population expansion, ageing, urbanisation, changing dietary practises and rising tobacco use, developing countries have a greater burden of cancer, including haematological malignancies.^[6] Essentially, because the stem cells are malignant, the progenitor cells are also malignant. Most of the causes are inherited. Those with a hereditary tendency can receive cancer risk evaluations, genetic counselling, preventative measures and long-term follow up.

The haematological malignancies are a class of cancers that develop when lymphatic or bone marrow cells undergo a malignant change. According to whether cancer is first found in the blood (leukemias), lymph nodes (lymphomas - Hodgkin and non-Hodgkin), or bone (myelomas), they are typically categorised by site. Hematopoietic stem cells and progenitor cells in the bone marrow give rise to the many different types of mature blood cells, including RBCs for delivering oxygen, WBCs for immune protection and platelets for wound clotting. Hematologic malignancies can be classified based on the type of blood cell they affect:

A. Lymphoblastic or lymphocytic:

They are a cancer in the lymphoid lineage, which includes white blood cells including T lymphocytes and B lymphocytes.

Examples: Multiple myeloma, acute lymphoblastic leukemia, chronic lymphocytic leukemia and lymphomas.

B. Myelogenous or myeloid:

They are a cancer in the myeloid lineage, which includes precursor cells to red blood cells, platelets, and white blood cells like granulocytes.

Myelodysplastic syndromes, acute and chronic myelogenous leukemia, and myeloproliferative neoplasms like essential thrombocythemia, polycythemia vera and myelofibrosis are a few examples.

The aim of the study is to identify and categorise leukemia, as well as to comprehend its prevalence and morphology. It's crucial to distinguish between lymphoid and myeloid leukemias because their treatment and prognosis are very different.

Aim and objectives

- To study the different types and subtypes of leukemias.
- To analyse morphological changes and to find out the prevalence of various types of leukemias.

Material and Methods

All the samples with abnormal hematological findings (200 sample size) from different departments were sent to the central laboratory, Dhiraj General Hospital, Piparia, Vadodara. The samples were obtained using EDTA vacutte and then passed through an automated hematology cell counter to get complete blood counts. The slides for peripheral blood smear were made. Field's stain, leishman stain and Geimsa stain were used to stain the blood smears. In some circumstances, following the written informed consent, a trphine biopsy or bone marrow aspiration was performed.

Each case received a thorough medical evaluation and history relevant to leukemia. On the basis of clinical information, hematological findings and morphologic appearance of the malignant cells, the kind of hematological malignancy was diagnosed.

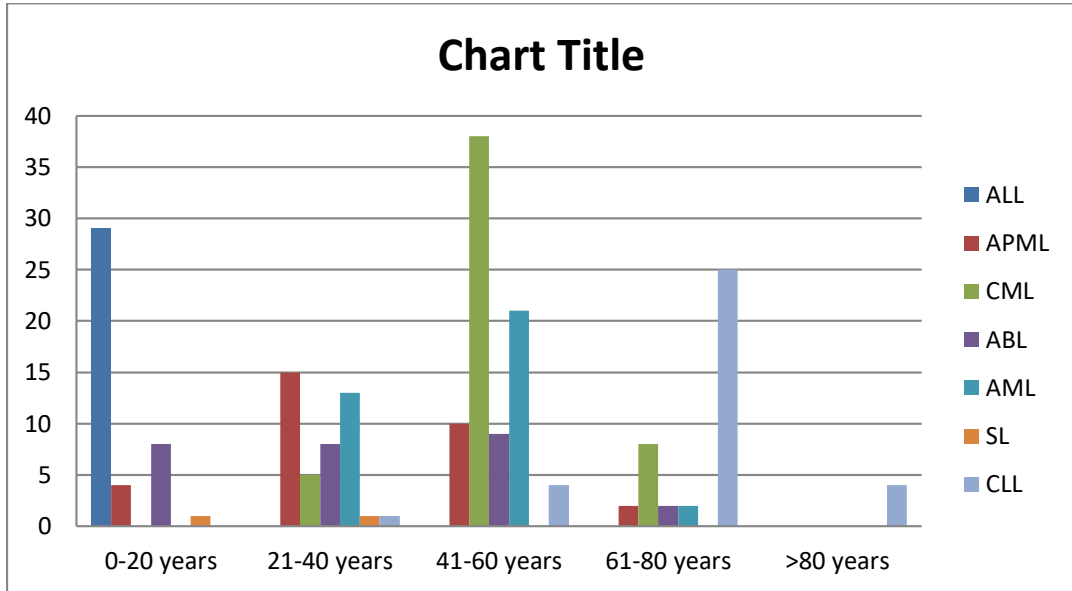
Inclusion criteria: All the suspected cases of hematological malignancies managed in Dhiraj General Hospital irrespective of age or sex.

Exclusion criteria: Clotted and inadequate samples

Statistical analysis

Data collected was analysed statistically using percentage and frequency distribution and was presented in the form of tables, charts and graphs.

Observations and Results



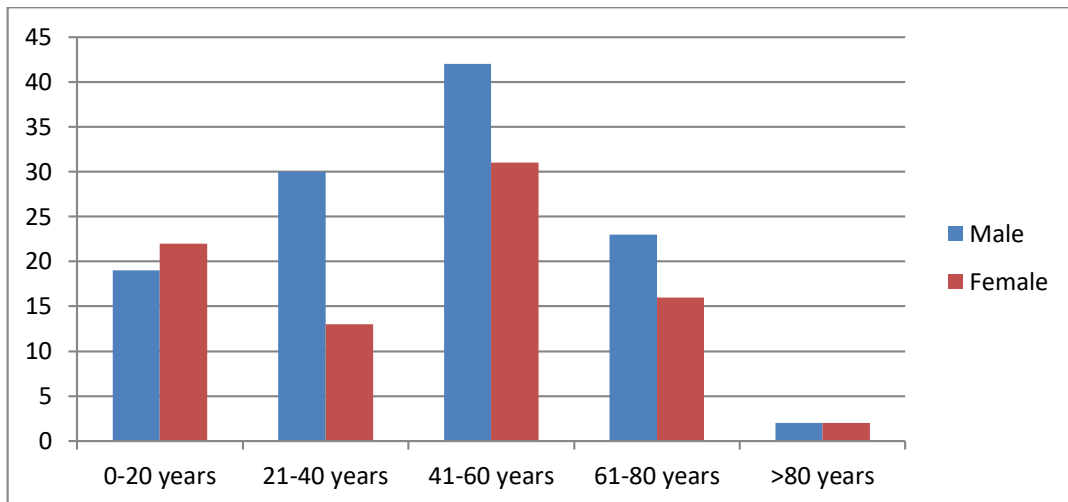
Graph-1: Age wise distribution of types of leukemia

- In pediatric age, the most common subtype is acute lymphoblastic leukemia (ALL).
- Chronic myeloid leukemia (CML) and acute myeloid leukemia (AML) can be seen most commonly in the age group of 41-60 years.

Table-1: Types of leukemia- Acute and chronic

Types	Number
Acute	120
Chronic	80
Total	200

- Acute leukemias include ALL, AML, ABL, APML, SL (subleukemic leukemia)
- Chronic leukemias include CLL, CML



Graph-2: Gender wise distribution of types of leukemia

- Females have higher incidence of leukemia than males in the age group of 0-20 years.
- In rest of the other age groups, males have higher incidence than females.

Table-2: Distribution of hemoglobin in various types of leukemia

Hb (mg/dl)	ABL	AML	CML	CLL	ALL	APML	SL
≤6	10 (37.03%)	15 (41.67%)	09 (21.95%)	-	24 (82.75%)	05 (16.13%)	02 (100%)
6.1-9.0	15 (55.55%)	12 (33.33%)	20 (28.78%)	04 (11.76%)	03 (10.34%)	21 (67.74%)	-
9.1-12.0	01 (3.70%)	09 (25%)	09 (21.95%)	24 (70.58%)	02 (6.89%)	05 (16.13%)	-
≥12.0	01 (3.70%)	-	03 (7.31%)	06 (17.64%)	-	-	-
Total	27 (100%)	36 (100%)	41 (100%)	34 (100%)	29 (100%)	31 (100%)	02 (100%)

Table-3: Distribution of WBC count in various types of leukemia

WBC ($\times 10^3/\text{ul}$)	ABL	AML	CML	CLL	ALL	APML	SL
1.0-50	15 (55.55%)	22 (61.11%)	07 (17.07%)	06 (17.64%)	10 (34.48%)	02 (6.45%)	02 (100%)
51-100	08 (29.62%)	14 (38.88%)	17 (41.46%)	20 (58.82%)	15 (51.72%)	24 (77.41%)	-
101-150	01 (3.70%)	02 (5.55%)	02 (4.88%)	01 (2.94%)	01 (3.45%)	01 (3.23%)	-
151-200	02 (7.41%)	-	05 (12.19%)	02 (5.88%)	01 (3.45%)	03 (9.67%)	-
201-250	01 (3.70%)	02 (5.55%)	02 (4.88%)	02 (5.88%)	-	01 (3.23%)	-
251-300	-	-	02 (4.88%)	-	-	-	-

>301	-	-	06 (14.63%)	03 (8.82%)	02 (6.89%)	-	
Total	27 (100%)	36 (100%)	41 (100%)	34 (100%)	29 (100%)	31 (100%)	02 (100%)

- The maximum number of cases have hemoglobin in the range of 6.1-9.0 gm/dl.
- The maximum number of cases have total WBC count in the range of 51,000-1,00,000.
- The maximum number of cases have platelet count <50,000.

Table-4: Distribution of platelets in various types of leukemia

Platelets ($\times 10^3$)	ABL	AML	CML	CLL	ALL	APML	SL
<50	21 (77.77%)	33 (91.66%)	15 (36.58%)	03 (8.82%)	28 (96.55%)	31 (100%)	02 (100%)
51-100	03 (11.11%)	02 (5.55%)	10 (24.39%)	18 (52.95%)	01 (3.44%)	-	-
101-150	-	-	03 (7.31%)	06 (17.64%)	-	-	-
>151	03 (11.11%)	01 (2.78%)	13 (31.70%)	07 (20.58%)	-	-	-
Total	27 (100%)	36 (100%)	41 (100%)	34 (100%)	29 (100%)	31 (100%)	02 (100%)

Discussion

Table-5: Gender wise distribution- comparative analysis

Author	Number of cases	Male	Female	Ratio
Present study	200	116	84	1.38:1
Dr. Akanksha Bothale Salkar et al ⁷	110	71	39	1.82:1
Ahirwar R et al ⁸	73	31	42	0.72:1

- This shows that the distribution of leukemias is more in males as compared to females. And it was compared with other study also

Table-6: Age wise distribution- comparative analysis

Age (in years)	Present study	Dr. Akanksha Bothale Salkar et al ⁷	Ahirwar R et al ⁸
0-20	42	29	18
21-40	43	27	20
41-60	82	39	21
61-80	39	14	14
>80	04	00	00
Total	200	110	73

- This shows that majority of the cases of leukemia can be found in the age group of 41-60 years of age group.

Table-7: Acute versus chronic leukemia- comparative analysis

Type of leukemia	Present study	Dr. Akanksha Bothale Salkar et al ⁷	Ahirwar R et al ⁸
Acute	120	71	34
Chronic	80	39	39
Total	200	110	73

- This shows that the distribution of acute leukemia is more in the present study as well as

Summary and Conclusion

All cases irrespective of age and gender with abnormal hematologic parameters were examined. The majority of patients were men. The majority of patients were aged 41 to 60 with 82(41%), followed by 21 to 40 years with 43(21.5%), least in > 80 years (2%). Out of the 200 patients, 120 had acute leukemia, which was the most common type (60%). In the current study, 27 (93.10%) of the patients with ALL were in the age range of 0–10 years, and 2 (6.90%) were in the 11–20 year range.

The most prevalent age range for acute blastic leukemia is 0 to 10 years, with 6 (22.22%) and between 41 and 50 years, with 5 (18.52%). The age range with the highest prevalence of AML is 41–50 years, with 16 (44.44%), while the lowest prevalence is 21–30 years, with 8. (22.22%). The majority of APML patients, 12 (38.71%) were in the 31–40 age range, while only 7 (22.58%) were in the 41–50 age range. The age group of 41 to 50 years had the most CML patients (17, or 41.46%), whereas the age group of 51 to 60 years had the fewest (11, or 26.83%). In our study, CML is the most prevalent leukemia with 41 (20.5%) cases, followed by AML 36 (18%) and the least common subleukemic leukemia, with 2 cases (1%). The age group with the highest prevalence of CLL cases is 61-70 years, with 13 (38.23%), followed by 71-80 years with 12 (35.29%), and 31-40 years with the lowest prevalence.

There is one case of subleukemic leukemia in people between the ages of 11 and 20 and one in every 21 to 30. The highest percentage of patients had haemoglobin levels between 6.1 and 9.0 g/dl, with 75 (37.5%), followed by 65 (32.5%) patients with haemoglobin below 6 g/dl, while the lowest had haemoglobin levels above 12 g/dl (5%). The majority of patients 98 (49%) in our study had total WBC counts between 51,000 and 1,00,000. In our study, 133 patients (66.5%) had platelet counts below 50,000, followed by 34 patients (17%) with counts between 51,000 and 100,000 and the least 9 patients (4.5%) with counts between 1,01,000 and 1,50,000.

References

1. "Leukemia". Merriam-Webster.
2. "What You Need To Know About™ Leukemia". National Cancer Institute. 23 December 2013. Archived from the original on 6 July 2014. Retrieved 18 June 2014.
3. "A Snapshot of Leukemia". NCI. Archived from the original on 4 July 2014. Retrieved 18 June 2014.
4. "SEER Stat Fact Sheets: Leukemia". National Cancer Institute. 2011. Archived from the original on 16 July 2016.
5. Hutter, JJ (June 2010). "Childhood leukemia". *Pediatrics in Review*. 31 (6): 234-41. doi:10.1542/pir.31-6-234. PMID 20516235.
6. Cordo V, Meijerink J (January 2021). "T-cell Acute Lymphoblastic Leukemia: A Roadmap to Targeted Therapies". *Blood Cancer Discovery*. 2: 19-31. doi:10.1158/2643 3230.BCD-20-0093.
7. Dr. Akanksha Bothale Salkar, Dr. Anjali Patrikar, Dr. Kalpana Bothale Dr. Sadhana Mahore, Dr. Amit Salkar, Dr. Shruti Modani , Clinicohematological Evaluation of Leukemias in a Tertiary Care Hospital , *IOSR Journal of Dental and Medical Sciences, Volume 13, Issue 12 Ver. V (Dec. 2014), PP 126-134*
8. Ahirwar R., Nigam R.K., Parmar D. A study of leukemias Profile in central India, Pathology Update: Tropical Journal of Pathology & Microbiology, April - June, 2018/ Vol 4/ Issue 2, 181-187.